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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/886,213	06/22/2001	Yuji Matsuyama	210029US3DIV	7008
22850	7590	11/06/2003	EXAMINER	
OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C.			JOLLEY, KIRSTEN	
1940 DUKE STREET			ART UNIT	
ALEXANDRIA, VA 22314			PAPER NUMBER	

1762

DATE MAILED: 11/06/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/886,213

Applicant(s)

MATSUYAMA ET AL.

Examiner

Kirsten C Jolley

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 September 2003 and 27 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4, 6-8 and 25-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 6-8 and 25-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☒ Certified copies of the priority documents have been received in Application No. 09/272,782.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on October 27, 2003 has been entered.

Response to Arguments

2. The 35 USC 112, 2nd paragraph rejection made in the final Office action has been withdrawn in response to Applicant's amendment to claim 26.

3. Applicant's arguments filed September 26, 2003 have been fully considered but they are not persuasive.

Applicant argues that You et al. does not disclose a method including a step of lowering an oxygen concentration of a treatment atmosphere by replacing the treatment atmosphere with inert gas when a temperature of the substrate is lower than the temperature at which the coating solution oxidizes because You et al. describes an inert gas for preventing oxidation of the BCB ILD material and the wafer during the elevated temperatures, not at a lower temperature.

Applicant states that the claims of the present invention use inert gas when a temperature of the substrate is lower than the temperature at which the coating solution oxidizes. The Examiner notes that the claims require that the temperature *of the substrate* is lower than the temperature at

which the coating solution oxidizes when the oxygen concentration is lowered, not whether the temperature of the atmosphere in the chamber is high or low. You et al. teaches the use of controllable raising and lowering (ramping up and down) of the substrate via lift pins in order to controllably ramp up and ramp down of the temperature of the substrate (col. 6, line 19-25). You et al. teaches that the controllable ramping up and down by lifting pins prevents oxidation of the BCB coating since purging of the atmosphere to provide an inert atmosphere in the heating chamber takes a similar time (col. 6, lines 31-39 and col. 7, lines 44-47). Therefore, You et al. teaches that when the substrate is held on the lift pins above the substrate (before ramping down the substrate to sit directly on the hot plate), the temperature is still lower than the temperature at which the coating solution oxidizes, and also simultaneously inert gas is introduced into the chamber. Thus, the introduction of the substrate into the second curing hot plate station and the commencement of ramping down of the substrate while simultaneously purging the atmosphere using inert gas meets Applicant's claim limitation of lowering an oxygen concentration by replacing the treatment atmosphere with inert gas when a temperature of the substrate is lower than the temperature at which the coating solution oxidizes. It is known that the temperature of the substrate when it is initially held over the hot plate on lifting pins and when ramping down is commenced is lower than the temperature at which the coating solution oxidizes because You et al. teaches that the "rampings prevent oxidation of BCB" (col. 6, line 31).

Applicant also argues that the reference oxygen remaining in the chamber 19 which is being exhausted to a desired vacuum level could cause oxidation during the elevated temperatures. The Examiner disagrees. As stated in col. 6, line 31, "rampings prevent oxidation

of BCB”, therefore it is known that oxidation of the coating does not occur in You et al.’s process.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-4, 6-8, and 25-27 are rejected under 35 U.S.C. 102(e) as being anticipated by You et al. (US 6,066,574).

You et al. discloses a method of heat-treating a substrate coated with a coating solution (BCB) which oxidizes at a high temperature. You et al. teaches providing a series of three hot plate heating stations (a solvent dispersal station, curing station, and cool-down station) whereby lifting pins 23 contact the lower surface of the wafer substrate and controllably lower and lift the substrate 12 onto hot plate heating element 21 (see col. 6 and Figure 3). You et al. teaches that the controllable ramping up and down prevents oxidation of the BCB coating since purging of the atmosphere to provide an inert atmosphere in the heating chamber takes a similar time (col. 6, lines 31-39 and col. 7, lines 44-47).

With respect to claims 1 and 5, the Examiner notes that the introduction of the substrate into the second curing hot plate station and the commencement of ramping down of the substrate while simultaneously purging the atmosphere using inert gas meets Applicant’s claim limitation

of a) lowering an oxygen concentration of a treatment atmosphere when a temperature of the substrate is lower than the temperature at which the coating solution oxidizes. It is known that the temperature is initially lower than the temperature at which the coating solution oxidizes because You et al. teaches that the "rampings prevent oxidation of BCB" (col. 6, line 31). With respect to claim 25, at this point in time the substrate is held on support pins 23 capable of appearing and disappearing from and into a holding and heating member for supporting the substrate apart from the holding and heating member.

Heat-treating in the second curing hot plate station of You et al. meets Applicant's limitation b) of heat-treating the substrate in the treatment atmosphere of which the oxygen concentration has been lowered so as to not cause oxidation of the coating solution. With respect to claim 26, during this step the substrate is held on hot plate 21 -- a supporting and heating member.

You et al. teaches transferring the substrate to a cool-down station where the substrate is subsequently cooled and ramped up from the cooling plate, thus meets the limitations of step c) of cooling the substrate on a cooling plate to a temperature lower than the temperature at which the coating solution oxidizes. After the cooling process is performed (and necessarily after the equipment is shut down), it is noted that the treatment atmosphere is returned to that with the original oxygen concentration. With respect to claim 27, it is noted that after this cooling step is performed, the substrate is apart from the cooling plate by supporting pins disposed adjustably in height on the cooling plate. After the cooling process is performed and necessarily after the equipment is shut down, it is noted that the treatment atmosphere is returned to that with the original oxygen concentration. As to claim 7, it is noted that the substrate temperature is

necessarily already lowered below a desired value in the cool-down station, and then removed from the cool-down station, before the equipment is shut down.

As to claim 4, You et al. teaches that BCB is organic at col. 2, line 31.

With respect to claims 6 and 8, it is noted that, after removal from You et al.'s coating and heat treatment apparatus, the substrate is exposed to air -- this is both after the passage of a predetermined time from the completion of heat treatment (even if only a fraction of a second) and when the temperature of the substrate is lower than a predetermined value (this is known since the substrate has already been cooled to a desired value).

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kirsten C Jolley whose telephone number is 703-306-5461 before December 10, 2003, and will be 571-272-1421 after December 10, 2003. The examiner can normally be reached on Monday to Thursday and every other Friday.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive P Beck can be reached on 703-308-2333 before December 10, 2003, or 571-272-1415 after December 10, 2003. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1193.

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Kirsten C Jolley
Patent Examiner
Art Unit 1762

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